

# Ithaca engineering students build, pitch ideas

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*Some Ithaca students are participating in Project Lead the Way, a national non-profit organization that develops science, technology, engineering and math programs, known as STEM.*



(Photo: DAVE BURBANK / Provided Photo)

ITHACA – The five Ithaca High School engineering students thought they had a can't-miss idea.

An automatic music page-turning device would save musicians from fumbling with their score sheet, curing the frustration of putting down an instrument to get to the next page of notes. Their idea, which the students intended to use as a capstone project in their senior-year engineering class, would take the aggravation out of flipping the page using a device they were certain musicians needed, wanted and would pay to have.

But when the students sent out a survey to test the idea with local musicians and Ithaca College music professors, they did not get the response they expected. The idea, it turned out, drew a sour note.

"It's an interesting idea, but we would not use it," Illa Burbank, an adult mentor for the group, recalled of the response from the music community.

Instead of getting discouraged, the students switched gears: a power-generating idea that uses bicycles to charge cellular phones and LED lanterns for electricity demands in the developing world.

That concept, along with five others created by groups of Ithaca pre-engineering students, have been developed this semester as part of their senior-year project. The projects are a culmination of the skills they have been honing since freshmen during an intensive set of classes at Ithaca High School. The coursework is part of Project Lead the Way, a national non-profit organization that develops science, technology, engineering and math programs, known as STEM, from kindergarten through high school.

At Ithaca, it's a curriculum that starts with technical drawing and the basic engineering process and then ramps up to complex computer programs for modeling and integration with advanced technologies such as 3-D printers.

"It's been a great foundation for engineering," said Ethan Skutt, a senior and member of the group developing the bike power-generating idea. "It has confirmed my interest in engineering, and I now plan on pursuing it in college."

While the senior-level project has always tested the students' acquisition of tangible engineering skills, it also forces them to seek answers outside the classroom. It's an essential lesson as the students branch out to apply what they learn in a real-world environment.

"To help them not be afraid to reach out to those in the community — to actually pick up the phone instead of just sending an email and crossing their fingers for a reply — is really big," said technology education teacher Ian Krywe, who said the projects incorporate a wide-range of electronic and specific skill sets that include marketing and consumer research. Krywe and teacher Scott Breigle lead the technology program at Ithaca High School.

This year for the first time the projects have added in an entrepreneurial element, which Krywe credited to the leadership of Burbank, the president of IthacaSTEM, a science advocacy group in the school district, and mother to one of the students in the class.

The project blends the technical skills with lessons on the business acumen needed to bring a product to market. Each group brainstormed ideas in the fall, and were then assigned adult mentors to help shepherd them through the arduous process of research, planning and the development of a business strategy.

The project put students in touch with community mentors with strong business connections, such as Burbank, the chief financial officer of Incodema, an Ithaca-based company that provides sheet metal prototypes, and other business leaders from companies such as Purity, Taitem Engineering, Rev, Vroom Consulting and Greengage.

For two months the students have been hard at work researching customers' needs, developing business plans, creating a budget and perfecting their design. The mentoring process showcases to the students the necessity of collaboration in modern design, Burbank said. Even the flexibility that made her group drop their original concept of the music page-turning device was a positive development that mirrors much of what happens in design companies every day.

"I told them, that's fantastic, because it's better to admit to a mistake and go in a different direction than to hold onto an idea that doesn't work. That was a great process for them to learn," she said.

The ideas from the 23 students show the ingenuity of their thinking. It includes Full Cycle Bikes and Human Power, both of which are developing products to capture sustainable power sources for practical use. Where the bike design harnesses kinetic energy for use in the developing world, Human Power tries to take energy created while walking to charge batteries.

Other ideas include the Lake Rake, which refines the method for pulling hydrilla from infested waterways, while another attempts to solve the problem of broken electrical plugs with a rubber protector that fits over the prongs when not in use. That group has even filed a provisional patent to protect their idea as they move toward developing the concept.

The idea for MediMove, a design integrating an EpiPen with a cell phone case, came about when one student almost went into anaphylactic shock while on vacation. Tommy Strawderman had been traveling with his family in Chicago when he mistakenly ate chips cooked in peanut oil. His body's peanut allergy reacted with dangerous swelling as the family raced back to the hotel to retrieve his epinephrine injector.

While people with allergies often times forget their injectors, there is one thing that about 193 million Americans own and almost never leave home without: their cell phone. The group devised a concept that would incorporate an injector right into a cell phone case, with an idea for a sensor that would alert emergency personnel whenever deployed.

One group's idea touched on the more whimsical: the Pump Action Mods that allows Nerf guns to be modified to a pump-action, shotgun-style grip. It's an idea with a very specific consumer demographic: zombie wars on college campuses.

In the past, raising the money needed to design a prototype fell to the students' own initiative. That could mean holding a bake sale, wrangling vehicles into a car wash, or just pleading for help from mom and dad.

This year, in a new twist, the groups had five minutes to give their best pitch to the judges, who held the purse strings for money needed to create a workable prototype. It's a format popularized by the reality television show "Shark Tank" but which Burbank said is common practice in business schools and meetings with investors. By adding in the new component, students get experience in public speaking and forging connections with community members, she said.

Last month, all six groups pitched their ideas in front of four judges at Rev, the business start-up incubator on East State Street. The students pitched the products they envisioned to judges from business departments at Cornell University, Ithaca College and Tompkins-Cortland Community College, plus Ithaca Superintendent Luvelle Brown.

"Anyone going into a business world at some point will probably have to do a grant application, will have to request funds from someone," Burbank said. "And this is a great experience to do that in high school when people are much more gentle."

After evaluating their proposals, the judges came back with their decisions, with full investment in all the groups, except for one.

For the Plug Saver group, they asked for extra money to hire a lawyer to help with the patent. The judges said that, with the help of places like Cornell University, that wouldn't be necessary.

"We can definitely find you a patent lawyer to help you with that cost," said Zach Schulman, the director of entrepreneurship at Cornell.

With the ideas fully funded, the students get back to work taking their work to the next level as they make prototypes, test their design, and keep working to make their concepts viable.

"People have great ideas," Krywe said. "If you have engineering skills and business or marketing skills, those things together, that's going to take some people places."

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## Teams

### The Plug Saver

•Mentor: Brad Treat, Instructor

•Cameron Burbank

•Neil Nicholson

•Steele Steffy

•Kevin Tian

**Lake Rake**

•Mentor: Beth Mielbrecht, Taitem

•Noa Davis

•Reuben Rappaport

•Rishi Verma

•John Westwig

**MediMove**

•Mentor: Chris Camadella, Vroom

•"At Large" Mentor: Aaron Proujansky, Greengage

•Alex Bergman

•Patrick Skawski

•Tommy Strawderman

**Full Cycle Bikes**

•Mentor: Illa Burbank, Incodema

•Isaac Lawson-Hughes

•Diego Lopez Crane

•Katie Nunnick

•Wil Rudan

•Ethan Skutt

**Pump Action Mods**

•Mentor: Bruce Lane, Purity

•Andrew Dev

•Daniel Dracup

•Duncan Patwell

•Kevin Smith

**Human Power**

•Mentor: Brian Bauer, Rev

•Vibhav Santhanam

•Ben Stewart

•Stephen Stover

•Student Mentor: Jelle Schukken

**Community volunteers**

**Instructors**

- Dan Cohen, Cornell lecturer, eLab Incubator
- Eric Eisenhut, Kensa Group Predismo
- Tony Eisenhut, Kensa Group, Rheonix
- Brad Grainger, Cain Brothers Funding
- Brad Treat, Sight Speed, Entrepreneurship at Ithaca College and Cornell

**Judges**

- Luelle Brown, superintendent of Ithaca City Schools
- Barbara Howard, associate dean school of business, Ithaca College
- Tim McCabe, TC3 chair of entrepreneurialism department
- Zach Shulman, director of entrepreneurship, Cornell

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